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ABSTRACT

In making effective use of technology, instructors must face several challenges, such as deciding which technology is really necessary for effective teaching and working with limited department budgets. In addressing these issues, faculty should be aware of three major trends in communications technology: miniaturization of the media of communication, the multiplication of electronic delivery, and the convergence of media delivery systems. One important delivery system is interactive video, providing students with visual instructional materials, while requiring them to interact with presentations. Students using interactive video learn faster, with instruction taking from 30% to 35% less time than with other methods, and retain the information longer. Video discs can hold more information than video tapes and allow the instructor to call up any particular frame or vary the speed. In addition, instructors can easily and inexpensively create individualized instructional programs by using one of the authoring tools on the market. Twelve ways to become better "visions-oriented" are listed including: instructors, faculty should keep up-to-date on new technologies, build personal libraries of images and sounds that might be used in instruction, contact their institution's multi-media departments for available equipment or consider budgeting personal funds for interactive equipment, and seek excellence rather than perfection in dealing with the visual arts. Contains 18 references. (TGI)

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Visions Management: Effective Teaching through Technology

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VISIONS MANAGEMENT
EFFECTIVE TEACHING THROUGH TECHNOLOGY

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Abstract
This paper will research and analyze the ramifications of incorporating the uses of several new technologies for college teaching in the 21st century. For example, it will discuss how the use of video tapes, an excellent medium for providing information for today's classroom instruction, is not always precise enough from a time management or a classroom management standpoint for complete classroom efficiency. Included in the paper will be an analysis of the potentials for such devices as erasable video discs, laser videos under computerized control and the digitation of print,, image and sound.

Statement of Purpose
The purpose of this paper is to present a position--or a hypothesis-that college teachers/professors be more visually oriented than they have demonstrated in the past and be more current in media technologies as well as becoming an advocate for continued improvements in the field of education.

The title: Visions Management--Effective Teaching Through Technology was selected because it connotes the difficult challenges that college educators will face as education embarks into the 21st century.

The first challenge that each of us must meet is the incorporation of a personal vision: such as asking ourselves what really is important and necessary for effective college teaching? The second challenge is how can we manage our individual or department resources to budget for these challenges?

A breakdown of the first two words of this paper may appear to be a paradox. Actually, this is far from the case. A vision, according to Webster is "an act or power of Imagination." Its related word "visionary" suggests that one who is visionary is actually a dreamer, someone whose ideas or projects are impractical or who lives in a world of fantasy and imagination. Third negative connotation (applicable to this definition) is that a visionary is someone who has ideas or conceives of impracticable projects.

On the other hand, the word "management" suggests a judicious use of means to accomplish an end.
By putting the two words together, hopefully, you, as the reader, will consider a philosophy of teaching methodologies which orchestrates continued education, a dedicated effort, imagination and judicious use of time and money to improve your teaching.

The Problem
The problem, as this writer views it, is that many instructors do not take full advantage of visual aid technology today, let alone be prepared for the future. Also, are we, as college instructors, becoming cognizant of these future changes in technology as they pertain to successful college teaching?
Major Trends in Communications Technology: Three major trends in communications technology have emerged, actually paralleling each other during the past 50 years:

1) miniaturization of the media of communication,
2) multiplication of electronic delivery, and
3) convergence of media delivery systems

While all three of the trends will be discussed, this paper will highlight the new technologies regarding the convergence of instructional media and will present a program or a checklist of considerations on how to convert these technologies to various disciplines or subjects.

Discussed will be uses of the interactive video systems and the impact on teaching methodologies. Included will be the uses of video tapes, video disc, digitization of print, image and sound and other laser-related systems, as it pertains to various subjects or disciplines.

Miniaturization: What Is It?

Perhaps, the most important technological trend affecting instructional media has been the miniaturization of media equipment.

For example, this researcher recalls receiving a portable radio for a high school graduation present that was considered the "state of the art" for portability. The radio measured 8" x 10" x 4" inches, and contained a battery twice the size of today's portable radios. Several years later, as a young Marine undergoing electronics training at Memphis, Tennessee, he recalls that the idea of transistor radios and printed circuits was merely a theory. Even fifteen years later (in the mid 1970s) the concept of developing a tape player and a slide projector to fit into a unit the size of a typical suitcase was innovative. While the two of us accomplished the feat, our director, Dr. Arthur Olson, the Director of the Cooperative Accountability Project, (Colorado Department of Education), experienced some difficulty in carrying the 25-pound suitcase from airport to airport.

Today, 16mm film projectors, audiocassette recorders and players, video recorders, and computers all are much smaller in size and could fit into the suitcase with ease.

Probably, the most striking example of miniaturization has occurred in computers. Computers, at one time, were about the size of a typical professor's office (10 ft. x 10 ft.). Due to advances in microchip technology, computers are now comparable in size to television sets and incur about the same amount of expenditures.

The educational importance of this development is that the use of computer technology for instructional purposes becomes logistically and economically feasible.

The degree of miniaturization that has evolved in the realm of micro-processors is also mind boggling. The wiring in the integrated circuits of the pre-1980 era could be inspected with the naked eye. The following generation of integrated circuits required a magnifying glass. Next, were the tiny integrated circuits etched in silicon using optical lithography or electron beams under a microscope. Recently, tiny biological microprocessors of protein or "biochips" were formed. The biochips are measured in the range of 10 to 25 nonometer (a nonometer is one-billionth of a meter).

A recent speech by John S. Mayo, president of AT&T Bell Laboratories points out the difference in the state of the art. He indicates, "One measure of microelectronics progress toward increasing power is the number of components that we the technicians at AT&T Bell can cram into a silicon chip the size of the fingernail." "The number is doubling every 18 months." he continues.

"That trend will have matured by 2010, with chips containing up to a billion components for highly packed circuits such as memory. For typical custom logic circuit that range should be in the 100 million to 1 billion components region."

The main problem, according to Mayo, is one of economics, since the chips would cost $1 to 10 billion dollars.

Multiplication of Electronic Delivery Systems

Another technological innovation with its impact on education is the multiplication of electronic delivery systems. Today, we have instruction via open broadcasts by radio and television stations, microwave systems, satellite and close-circuit systems (such as cable television) and the telephone.

Although instruction via open broadcast by radio and television is significant, there is also a trend toward closed distribution systems-microwave, closed-circuit, satellite. Unlike open systems these have the advantage of being able to transmit a number of instructional programs simultaneously.

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Satellite systems can also increase the range of the instruction because signals can be transmitted to any spot on earth and can be carried by cable and/or microwave systems to any instructional area, thus eliminating the need for redistribution by cable. Satellite systems can be received and transmitted via telephones equipped with optical fibers capable of transmitting thousands of messages simultaneously.

Interactive Video Systems

As previously stated, the major emphasis of this paper was to focus on interactive video systems and laser technology; interactive video systems is a multi-media system.

The term multi-media refer to information that combine more than one medium, where the media can include speech, music, text, data, graphics, fax image, video and animation. The systems are integrated and are commonly controlled or synchronized.

A recent Public Service Network presentation of the Civil War demonstrated how a sophisticated, integrated and creative endeavor can produce realistic and entertaining results.

To enable the system operation, the interactive video system requires the following components:

a) television monitor
b) videodisc or a video tape player
c) computer
d) interface device
e) disc drive

The "heart" and the "brains" of the interactive video system is the computer and "arms and the legs" or the brawn is the video disc player. Computers provide powerful decision-making capabilities which video players lack. Computers also provide the intelligence required for the interactive video to operate. Combining these technologies establishes the strengths of each, compensating for the limitations of the other and providing a proper learning environment for students.

The computer storage system is usually a small disc, which may hold the instructional program and store other information.

The video player presents the visual and audio information and in a variety of forms and has a tremendous possibility for learning and creativity (to be explained later).

The monitor is used to display the video signal and sound from the video player. It provides output from the computer program, usually in the form of printed verbal information, but graphics and sound are also possible. Some videodisc players, which are available today have the memory and input devices built into them.

The last element of the interactive video system is the interface device. It provides the link between the computer and the video player, allowing the computer to communicate with the video player. Through this device, the computer can control which portion of the video is presented to the learner.

n the area of instruction, interactive video features programmed instruction and computer-assisted information to achieve effective and efficient learning. This capability provides the viewers not only with sight and sounds but the option of responding and controlling the pace of the program.

Operations: The computer commands the video player to present the audio and/or video information from the video tape or video disc and wait for the learner's response. After the response is analyzed by the computer, it suggests an appropriate point in the programmed instruction. The responses can be made by touch, light pen, keywords or by "mousing" (using the mouse) the information requested. The images can be presented in slow motion, fast motion, frame by frame or a single frame-equivalent to slides or filmstrips.

Programmed instruction is another application. The use of programmed instruction in the past was an approach for a superior student to avoid reading an entire textbook or an instructional booklet. For example, if one were successful in answering 8 of 10 questions pertaining to a certain subject, one could eliminate reading or re-reading various chapters in the book. On the other hand, if one had difficulties grasping a certain subject, one could read, re-read or review those deficient chapters.

One of the major advantages of interactive video is that it requires learner response. By requiring frequent response, the interactive video system captures attention and, in some cases, a menu can be offered for the various types of students.

In accordance with a recent research study, students using interactive video not only learn faster and retain the information longer but learning takes 30 to 35 percent less time than other methods.

Recently two other studies endorsed the use of television and interactive video systems as a significant teaching tool in the nation's classrooms. Key finding pointed out:

1. Students learn more and had a higher interest in the subject materials with interactive video systems (ITV) in place.
2. Students exposed to ITV showed four times more improvement than the control groups on test scores.
3. Students displayed more ingenuity and innovation on assignments and their writings were more creative and descriptive.
4. Students were more confident and enthusiastic in class.

Video tapes and video discs

Initially, many instructional users preferred video tapes. The reason: they wanted a system in which they could record their own programs well as playback mass distributed programs Until technology creates a suitable erasable video disc (which this presenter predicts will happen in the 21st century), video tapes may dominate the market for the cost-conscious instructor. However, this concept could be changed, not by technology, but by law enforcement.

According to Warren Deatherage, Director of the Tape Laboratory at Pittsburgh State University (Kansas), "if states enforced the laws regarding video taping (only 30 days usage for educational purposes in some states), there could be a re-thinking about the use of video tapes.

In addition, video tapes, eventually wear out, lose quality and twist or break in the machine during operation, especially if there a significant amount of fast-forwarding and rewinding.

Video discs actually offer more promise for the future than video tapes. Video discs are generally 12 inches in diameter and can hold up to 100,000 frames of information. Each frame represents one slide.

Two different formats are used to store pictures.

1. CAV format (Constant Angular Velocity)
2. CLV format Constant Linear Velocity)

Which format should you use? It depends upon your application. The CAV format has the advantage of "stop and go" action. Pictures are stored in concentric circles that are read with a laser beam. While changes can occur within the program, pictures or frames once programmed on the videodisc cannot be changed.

The significance of this application is important for teachers since each frame has its own number so that the programmer can call up on the monitor any number or any combination of numbers he or she chooses. (The process is as easy as working your remote for your television at home). Furthermore, the instructor has the capability of varying the speed--twice the speed, one-half the speed, one quarter the speed, etc.

How can this technology be applied to your instruction? It depends, of course, on teaching methodologies and the subject matter being taught. This system has the capability to assist in analyzing skills or in breaking down segments for instructional purposes. Consider how beneficial it would be for a coach to analyze the application to athletic feats utilizing this system pole vaulting fourteen feet, hitting a baseball at 90 miles per hour and executing a high dive off the diving board are direct examples.

As a professor of advertising, one could use the capability of the interactive video system to compare Coca Cola ads with Pepsi Cola ads. In an upcoming Super Bowl, classify various types of advertisements drink in a specific program (product, public service announcements or public relations advertisements) or analyze ads according to numerous other categories.

The CLV format while it holds more pictures or frames (100,00 vs. 54,000) loses many of the best features of the videodisc such as still frame, step frame, multi-speed and frame speed modes. This format is usually used to play movies and other programs that are produced to be linear.

Another feature of the two systems is that the audio is stored in two different tracks. This option provides the possibility of having two different languages for the same program.

To aid the instructor, videodisc activities can be divided into three levels.

Level one--The Level One videodisc system adds a massive storage capacity for motion pictures. At this level, the videodisc player is controlled with the aid of a remote control panel for Stop, Start and Scan features. The hardware components consist of CLV laserdiscs, a laser player with remote control and a TV monitor.

Level Two--The Level Two videodisc system is the same as Level One but has one additional feature--a player with a built-in programmable capability. This capability can result in students being able to interact with the video presentation by using a remote control panel for searching chaptersand lessons in any combination or sequence.

Level Three--The Level Three video system is a computer-assisted learning approach suitable for inter-activity. By using this system, it is possible to design videodisc-based software with computers that can be used for individual instruction. The hardware components consist of a laser player with a computer interface, a television monitor, a microcomputer and an authoring system (software) for designing interative lessons.

Creating Laserdisc Programs

With the use of one of several video tool kits on the market, college instructors can easily author their own programs.

The authoring software allows one to integrate on the computer screen graphics and text with interactive video and sound from the laser player. As the student moves through the content material, the laserdisc cues that one builds into the presentation automatically shows the student video clips and still illustrations. Then, one searches out the video sequence wanted from the disc with a standard Play, Fast Forward, Reserve and Stop buttons very similar to those on the remote control of the home video cassette player.

After the instructions has located the beginning of the video sequence, then it should be marked exactly where one wants the video clip to end. The toolkit then automatically makes a button that will play back the chosen piece of video whenever the button is clicked. Copy that video button to one's own program and students will view that video clip or still frame whenever they click on the button.

Most educational authoring tools such as HyperCard, SuperCard, Course of Action, Course Builder, Macromedia Authorware and VideoToolkit, either have laserdisc control facilities built into the program to allow the inventor to easily add on laserdisc capability. Typically, these authoring programs help one to control the laserdisc player via easily understood commands such as "Video play," "Sound on," or "Video stop." These controllers support the most common players used in interactive video.

While this paper has previously discussed how the laserdisc centers around student needs, this capability also holds true for instructors who need to author an integrated program.

Thus, any laserdisc can be redefined in any order one selects. This ability to repurpose a video disc, by the way, is crucial to making interactive video a classroom reality, because most educational budgets do not have the funding to produce too many unique laserdiscs. (Presently, the cost ranges between $300 to $500 per laserdisc).

Digitization of Print, Image and Sound

Many may have experienced digitized images in the late 1960s if one watches the televised close-up pictures of the Moon sent back to Earth by U.S. astronauts. The images from their video cameras were converted into a digital code--a series of 1s and 0s. The digitized information was transmitted back to Earth, where it was converted back into recognizable pictures.

Digitized images and laser technology, of course, were responsible for the making of videodiscs. This digitized information has numerous advantages. In stored formats such as the videodisc and compact disc, information can be scanned and accessed with a speed and accuracy not possible in analog formats. Certainly tape or film does not have the capability. In addition, videodiscs and compact discs can store more information than the analog formats. Finally, digitized still and motion images can be intermixed with a degree of manipulation not possible in film or tape.

Transmission of digitized information is less cumbersome than transmission of analog films. Analog sound and image must be transmitted on separate wires, but digitized sound and image can be sent over the same line. An optical fiber, about the thickness of a thread, can transmit vast amounts of information.

Digitation has to a number of systems for storage retrieval and transmission of information and will make older forms of media obsolete. For example, if still and motion pictures can be combined on one disc and the same piece of equipment can display both, why utilize filmstrips and 16-mm projectors? If laserdiscs are damage resistant and can store still and motion images, why maintain an inventory of fragile filmstrips and films ?

Following are some of the more popular units:

1. CD-ROM (Read Only Memory. By being plugged into a word processor, a dictionary, thesaurus, zip code directory and other references publications, the user has immediate access to important references.
2. CD-WORM (Read Once, Read Many Times). This format attempts to get around the read only memory limitation of CD-ROM. The disc can be inscribed with the user's choice of information. This is a useful format for those with a unique data bank that must be read often.
3. CD-I (Interactive) Verbal images, still images, graphics and computer software are incorporated into this format.
4. DVI (Digital Video Interactive). This format combines the features of CD-I with the added features of moving images.
5. Hypertext--This format combines, text, graphics, voices and other sounds to put the listener into a "you are there" mode.

Other Laser Devices

Another laser device in use is the laser beam. This item resembles a small flashlight but provides a fine ray of light for emphasizing certain parts or features of an audiovisual presentation.

Summary and Recommendations

This paper has described or summarized some of the new technologies for improving college teaching. They were:

1. The miniaturization of the media of communication
2. Multiplication of electronic delivery systems and
3. Convergence of media delivery.systems emphasizing the various ways to utilize interactive video systems.

While the information compiled is not complete or new but a summary of secondary information, this author considers it important to make specific suggestions or recommendations on how to become a better "visions-oriented" college instructor for the 21st century classroom.

To accomplish this endeavor, twelve key suggestions have been formulated. They are called:

Twelve Ways for Better Visions Management

1. Keep up to date with the latest technologies about educational media.
2. Plan the curriculum and analyze elements of the curriculum that need more explanation, more motivation or can be broken down into "segments of learning."
3. Become computer literate so that one can develop appropriate graphics and other information.
4. Build a file of still photos, photographs, artwork, and magazine and newspaper articles. Remembering that there are 54,000 to 100,000 frames to fill.
5. Develop a sound system library through audio tapes, etc.
6. Pursue one's audio video or multi-media departments for interactive video equipment and other necessary equipment.
7. Budget some personal funds for interactive video equipment
8. Develop a list of audio/video and laserdisc suppliers.
9. Develop alternative models for using IVS. Experiment with student reaction.
10. Seek excellence not perfection with the visual arts. It isn't necessary to have a staff of artists found in the motion picture and television industries.
11. Search for new ways to classify or reclassify your frames. It's just one click away.
12. Remember 20 years from now, everything included in this report will be obsolete.

In summary, by doing all of this, the reader will have gained more additional knowledge and students will have benefited from the results.

ENDNOTES

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